THE
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MAGIC
LANTERN
JOURNAL
AND
PHOTOGRAPHIC
ENLARGER
EDITED BY J. HAY TAYLOR
A MAGAZINE OF POPULAR SCIENCE FOR THE LECTURE ROOM AND THE DOMESTIC CIRCLE

WITH WHICH IS INCORPORATED THE "LANTERN WORLD."

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NOTICES.

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MAGIC LANTERN ANNUAL FOR 1897-8.

I HAVE pleasure in announcing that I have commenced the above ANNUAL for 1897-8, which it is the intention to publish about the first of September. It is very gratifying to know that the initial number last season met with a good reception not only in this country, but practically all over the world. In thanking numerous readers for their congratulatory remarks respecting the ANNUAL for last season, I would remind them that it is by having the expressions of a diversity of opinions that lanternists are enabled to make progress in their art, and that this forms a common ground on which all are entitled to express their opinions. Many of my readers and friends will doubtless have devised some improvement or other, either as to apparatus or methods, and an interchange of thought is most welcome—receiving an idea in return for another. I shall therefore esteem the receipt of short practical articles for the ANNUAL, and should it be necessary to give an illustration the better to describe an idea, a few rough lines will suffice from which a sketch may be made.

J. HAY TAYLOR, Editor.

NOTES.

J. Lizars at Aberdeen.—Mr. Lizars, whose headquarters are at Glasgow, has obtained the premises lately occupied by Mr. Florence (ironmonger), at 28, Bridge Street, Aberdeen, and fitted them up in a handsome style, and laid in a large stock of optical and lantern goods.

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The R.P.S. Annual Exhibition.—The forty-second annual exhibition of the Royal Photographic Society will be held at 5, Pall Mall East, London, from September 27th to November 13th. A private view, followed by a conversazione, will be held on 25th September. Those intending to exhibit can have forms and all necessary particulars on application to the Honorary Secretary, 12, Hanover Square, London, W.

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Quick Work in the Building Line.—The Eastman Kodak Company, finding their premises at Rochester, U.S.A., too small, have just built a new six-storey structure. The contract was signed February 5th. On February 8th, ground was broken and a building occupying the site demolished without delay, so that on March 2nd the stone work was started, and by the 20th the brick-masons were at work. The building was finished in six weeks from the commencement of the brickwork, and in the middle of May, many of the machines were practically ready for work. The size of the building is 100 by 117 feet.

◆ ◆ ◆

Pictures of the Queen.—Within the last few months a noticeable feature in the shop windows has been various pictures of the Queen. It would be interesting to know what sort of features would be the result of a composite photograph from the collection. One thing is certain, her most intimate friends would certainly fail to recognise her.

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The Photographic Convention.—This year, commencing 12th inst., the Convention will meet at Yarmouth. On that evening the proceedings will be opened by the Mayor of Yarmouth.

The "Photographic News."—The editorial offices of the News have been removed from Furnival Street, to 9, Cecil Court, Charing Cross Road, W.C.

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Lectures on Photography. — Mr. W. I. Chadwick, of Westwood, Sale, Cheshire, has commenced a series of popular lectures, and is open for further engagements in that line. Mr. Chadwick is a firm believer in the use of the lantern for illustrating lectures.

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Birmingham Oxygen Company, Limited.—A new company, with a capital of £5,000, has been formed to enter into an agreement with the old company and its liquidator, to manufacture and sell oxygen and other gases at Saltley Works, Birmingham.

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Mr. Albert Smith, the well-known proprietor of St. Ann's Wells and Gardens, Brighton, who takes special delight in giving astronomical lectures, has gone in for animated photographs with great success, and has lately fitted up dark-rooms in connection therewith.

Films for Cinematographs.

A NEW NAME WANTED.

IN our last issue statements were made to the effect that cinematograph films were frequently at fault, and that these imperfections were due to the temptation which makers were under to supply the urgent demand for goods, without regard to quality.

From the heading of the article we had hoped that our readers would understand the word "films," as used, to mean films upon which transparencies had been printed, and the words "makers and dealers," to refer to those who made the positives or dealt in printed film, and not to the manufacturers of the sensitive bands of film. Mr. George Dickman, the managing director of the Eastman Photographic Materials Company, calls our attention to the fact that the use of the words "makers and dealers" in this connection is incorrect and productive of serious misunderstanding, also that as the Eastman Company make about nine-tenths of the film used, the words might be construed to apply to that firm. This, of course, was not our intention. Unfortunately films as films, and films printed with transparencies for cinematographic projection, both go under the name of films; and we sometimes hear of a new film being placed in the lantern, or of an exhibitor having a selection of so many films, these of course meaning printed films. Then again, the photographic artist or printer who attends to the making of the pictures orders so many films on which to print, and these when printed and perforated **are still called films.**

It will thus be seen that some distinguishing name is required to differentiate between the fresh sensitive bands of film and the printed films. It would be well if exhibitors and dealers were to agree to adopt some clear distinction, and with regard to this, we shall be glad to hear the opinion of our readers as to the selection and use of some suitable and euphonious words.

With respect to glass plates, matters are entirely different. We speak of a transparency plate, but as soon as a picture has been printed on it, it is then known as a lantern slide. Consequently there is no **danger of confusion,** the terms, "makers of plates," and "makers of slides," being distinctive and well understood.

Speaking of films, many persons seem to be of the opinion that, in some way or other, there is a large element of danger connected with their use, as they are supposed to readily take fire. This, however, is an erroneous impression which anyone may easily correct by a simple test. Through the kindness of Mr. Dickman we had recently a quantity of film placed at our disposal, in order to conduct a few experiments in this direction, and the result of these experiments goes to prove that celluloid film when rolled up ignites only a little more readily than a roll of thin paper, and that even when the roll of film was well alight, the flame could be extinguished by hitting it **with the naked hand.**

A long strip of film, or in fact paper for that matter, lying loose will of course readily burn if a light be applied to it, and unfortunately it is too common at exhibitions for the operator to catch the bands of film (cinematograph slides, cinematotypes or whatever name they may be known by) in a basket, and even sometimes to allow them to fall on the floor, after they have passed through the lantern, leaving them to be subsequently wound up at leisure. This is a practice which should be discouraged, and many makers of cinematographic apparatus now supply their instruments with a receiving spool on which the film is automatically wound after it has passed the condenser. As a means of obviating all chance of accident it would be well if those responsible for exhibitions would insist on the apparatus being fitted with an automatic winder.

Prominent Men in the Lantern World.

No. IX.—Mr. R. R. BEARD.

ALL lanternists have used, or at least heard of, Beard's compressed gas regulators. These are made at 10, Trafalgar Road, Old Kent Road, London, under the supervision of the inventor, Mr. Robert R. Beard. A short description of this gentleman will be of interest to our readers in showing the rapid strides that can be made by the combination of good business ability and a sound scientific education.

When Mr. Beard left school, he commenced work as office boy to the engineering firm of Messrs. J. T. Oakley & Co., but after eighteen months of office work, they felt convinced that talent was lying dormant in the case of young Beard, so he was drafted into the lathe department, and finally into general engineering. This was a move in the right direction, and the subject of our sketch soon showed his capacity, for after a few years he attained the position of foreman, which position he retained until he commenced business on his own account.

His initiation into lantern work is attributed to Mr. W. H. Oakley, in selecting him as his assistant for exhibiting, etc., and it was here that he soon found room for improvements in various lantern apparatus; one of Mr. Beard's first inventions being an attachment for locking the taps of gas-bags, an article in days gone by which was much needed, when gas-bags were left to the tender mercies of a caretaker or lad whilst the screen was being erected.

The screw-down valve and combined jet tap can be placed to his credit. This was awarded a silver medal at the Cornwall Exhibition, and is said to be the first cut-off applied to limelight jets in this manner, and it has only comparatively lately been applied to jets by most of the high-class makers.

Another appliance that was most welcome was devised by Mr. Beard, viz., a self-centering carrier. This enabled slides of different sizes to be automatically centred in the lantern stage. Some few years ago hired slides were frequently of two sizes, and it was not uncommon for odd sizes to follow one another.

At the time when compressed gas began to come to the front, although it was found admirable for single lanterns it was a very difficult matter to use it for a dissolving lantern, as the pressure of the gas had to be continually adjusted, and an automatic regulator of some kind became essential. Mr. Beard set himself the task of overcoming this difficulty. This he soon managed, and a regulator was brought out under a joint patent (Beard and Oakley), but although it answered well, it proved to be too cumbersome and heavy for the average lanternist. About four years later Mr. Beard produced his now well-known small sized automatic regulator. It is needless for us to comment upon this, as its perfect qualities are well known.

Photo by Kœnig] *[373, Edgware Road, W.*

About five years ago Mr. Beard showed before the Photographic Club a new jet with which he was experimenting. It was made on the injector principle, and by using house-gas from the mains and oxygen from cylinder gave a light of about equal power to that obtained by the mixed jet. However, he found serious difficulties with this form when dissolving, so he decided not to proceed further on this system. Several other inventions of his have got no further than the experimental stage, for when anything of a dangerous element presented itself he decided not to put them on the market, it being a maxim with him to manufacture and supply to the lanternist only high-class practical "tools." And at the present time the name of R. R. Beard on a lantern appliance is at once accepted as a guarantee of its excellence.

The Eclipse self-centering slide carrier, which Mr. Beard devised and put upon the market, is a complicated piece of apparatus and well worthy of the high recommendations which it received at the hands of the judges both of the Crystal Palace and Cornwall Exhibitions.

As far as we can recollect, the above are the principal lantern apparatus which originated with Mr. Beard, but there are a great number of appliances upon the market, the final improvements of which are due to him; among these are camera clips, ether saturator, mixed gas jets, notably that known as the Pringle-Beard bellows, front lanterns, etc.

Mr. Beard is acknowledged to be as good an engineer as he is a lanternist, and from the photograph it will be apparent that he is yet a young man, but nevertheless, he has a family of seven sons and two daughters, but then he married young. One or two sons assist in the business, and about a year ago his second son contributed an excellent article on carriers, which appeared in the columns of this journal. Mr. Beard felt particularly proud of that son, for the first he knew of the matter was on reading it in his copy of the OPTICAL MAGIC LANTERN JOURNAL.

* * *

Smuggling.—The Director-General of French Customs has given instructions for X-ray tubes to be kept at certain Customs offices with the view to the prevention of such smuggling as watches and jewellery. A facetious artist has drawn a picture of passengers with their luggage passing in front of the X-rays, many strange things being thus revealed.

The Electric Light in the Optical Lantern.—No. VI.

By CECIL M. HEPWORTH.

(*Continued from page* 48.)

NOW that we have devoted some considerable attention to the more theoretical part of the subject, it will be as well to turn our notice to the practical portion and deal with the matter from the point of view of the itinerant lanternist arriving upon the scene of his evening's labours.

And first as regards the fuse, which, it will be remembered, is the point where the subject was left a month or two ago. To refresh our memory it may be again mentioned that the fuse is a kind of safety device inserted in an electrical circuit at different points along the wires for the purpose of automatically breaking their continuity at any time should the current become too large for them to carry with impunity. For the amount of current which you could draw from electric light mains would otherwise be only limited by the resistance offered by the work that you give it to do, and it might easily happen accidentally that that resistance was so small that an immense quantity of current would rush through the wires, with the probable result of burning them up and doing considerable damage to the installation generally. A fuse is a piece of easily melted tin or lead wire of small diameter in respect of the current that it is destined to carry. If from any cause this quantity of current is materially augmented, it will raise the temperature of that fuse wire above the melting point, and it will drop from between the terminals and immediately break the circuit and prevent the further flow of current.

So it will be seen that the first thing that a lanternist has to see to on arriving at a lecture hall is that the wires bringing the electrical supply into the premises are sufficiently large to carry the amount of current that he requires for his lamp, and that the fuses that are inserted in the circuit are such that they will not melt under any legitimate strain that they will be subjected to in the course of the evening. Over and above all the installation fuses in the hall, the lanternist should

carry his own private fuse,

which he can place in some easily accessible position near the lantern, and which he so arranges that it is in the lantern branch of the circuit only; no other current whatever should be drawn from the wires controlled by that fuse. The next cut-out beyond this, which would be one belonging to the hall, should be of greater capacity, so that in the event of an excess of current being taken from the wires the lantern fuse would be sure to give out first, for then the lanternist will know in a moment where to put in the renewal piece of fuse wire, and there will be the least possible delay. If the second cut-out is not exclusively on the lantern circuit, that is to say, if there are any other lights running on the wires in which the second cut-out is placed, that cut-out should be large enough to carry the current required to furnish the other lights, as well as enough to blow the lantern fuse, and a little to spare.

Fuse wire is made in several different sizes, and the electrical lanternist should always be provided with a few pieces of suitable dimensions. The wire is kept in stock by all large suppliers of electrical accessories in most of the sizes of the Standard Wire Gauge. One of these little instruments should also be carried by the lanternist, who will thus have a ready means of arriving at the current that a given fuse will carry. Thus, No. 18, S.W.G., which is 0·0437 inch diameter, will melt with a current of 15 amperes, while the next size smaller, No. 20, will give way at 10 amperes. When two or more pieces of wire are combined to produce a fuse of larger capacity, they should be

twisted together

into a single rope, and it should be remembered that the amount of current which such a compound wire will carry is a little less than the sum of the maximum currents that the individual strands will bear. Thus, two pieces of No. 20 bound together would hardly take 20 amperes without fusing.

The next question which presents itself is as regards the resistance that will be necessary to control the flow of current through the lamp. This will depend, of course, to a certain extent on the amount of light which it is desired the lamp shall yield, for the quantity of light is proportional to the current that passes through it, while the current depends upon the total resistance of the circuit. As the resistance which the arc presents to the passage of the electricity is not sufficient to prevent 100 volts from driving an incontrollable amount of electricity across it, it follows that an artificial, or auxiliary, resistance will be required to bring the total up to the necessary amount. What the extent of this artificial resistance should be it is rather difficult to say exactly, for the resistance of the arc (it is really more in the nature of a back electro-motive force than actual resistance) is a variable quantity, depending to a very great extent upon the amount of current flowing across it and upon various other factors.

Let us take a case for the ordinary practice of an electrical lanternist. We will suppose that the hall in which the show is to be given is a rather large one, taking, say, a sheet of thirty feet across or thereabouts. This will require, in order to give really satisfactory results, a far brighter light than will be yielded by any limelight jet. The last time I operated an electric lantern at the Crystal Palace, where the screen is of this size, I used a lamp that required a current of 15 amperes, and the result was in every way satisfactory. We will suppose that the available electric supply is one of 100 volts pressure, as it was in this case, and as it is in nearly every case where the supply is drawn from the corporation's lighting mains or even from a private installation.

Now the resistance of a 15 ampere arc is about 2·33 ohms, that of a 10 ampere arc being 4 ohms, and of a 7-6·5 approximately. It is the first that we are concerned with now. The total resistance of a 100 volt circuit in which 15 amperes flow must be 6·66 ohms, for fifteen divided into one hundred goes six and two-thirds. That amount of resistance has to be built up of that of the arc together with an extra resistance to bring the total to that amount. Of course the resistance of the arc must be subtracted for the total required, and the result, namely 4·33, is the amount of the artificial resistance that is required in circuit when it is desired to run an arc, taking 15 amperes, the original electro-motive force being 100 volts.

(*To be continued.*)

Stage Scenery for Amateurs.

By A. M. HIDDON.

(*Continued from page* 85.)

WHEN selecting a wall-paper with which to cover the canvas, choose a cheap-priced and rather showy one, but it should be without any very marked pattern in it, so that there may be no necessity for much accuracy in joining the edges, or patching, etc.; also, if a paper printed on an egg green ground be selected, the reverse side of it will be found useful for imitating glass, windows, etc. Papering the canvas is an easy matter, but it cannot be done quickly single-handed. Lay the frames on the floor front upwards, and cut the paper into suitable lengths and pieces. Well paste the back of the paper, and lay each piece evenly and straight in its position, pressing it down with a cloth or housemaid's broom to make it adhere to the canvas; and at the sides and top of the frames, carry the paper right round the edge to the back, using plenty of pressure to make it hold tightly. Shortly after the paper is stuck on, it will begin to crease in all directions, but all the wrinkles, etc., will disappear as the canvas dries again—a matter which will take twenty to thirty hours. Work, in the meantime, can be continued on the doors and other accessories.

So much for the walls. For the doors, frames of windows, and fireplace, etc., procure some "imitation wood" paper, such as is used for dados and halls. This has exactly the appearance of grained wood, and by its aid it is an easy matter to fashion a door, which at night on the stage will appear as solid and as real as anyone can wish. A four-panel door is the most effective, especially if the panels are filled in with wall-paper, and a little shading put round them with black chalk to give them depth. A glance at any unpainted door will show the way the grain which the wood paper imitates should run. The conservatory door or French windows can be effectively made by reversing some of the wall-paper and drawing in the sash bars, etc., with chalk. The wood paper is also used for adding a wainscot, door jambs, and lintels, etc.; in fact, with a little thought and patience all the woodwork of a room can be easily and exactly imitated. A narrow 2 inch border paper called, the writer believes, "egg and socket border," run round the door jambs gives them depth, and adds much to the general appearance. The mantel-shelf is a strip of wood a few inches wide, covered with an ordinary mantel border, and fitted on the under side with a couple of metal elbow brackets, which drop into slots fastened to the framework above the fireplace. It is well to have all fittings and accessories removable for convenience of carriage. Pictures can be hung where wanted. Japanese scrolls, fans, and other decorations are most easily kept in position by temporarily sewing them on to the paper and canvas walls.

With regard to

fitting the scenery up,

circumstances vary so much that full details will be useless, so the writer will merely outline the plan he always adopts if possible. Whatever plan may be adopted, it is absolutely necessary that the flats must be closely joined together, be upright, and above all, be very firmly fixed in position. The following method arranges for a sufficiently wide passage behind the scenery; the importance and convenience of which it is difficult to overrate. At a distance of 2 feet from the back wall, and at a height of 6 feet from the stage, stretch a rope fairly tightly across the room. Against this line, place the three back flats so that the former passes over each of the upper cleats at the back of the latter, thus holding them fairly securely at once. When the three flats have been arranged quite upright and in close contact, drive pieces of batten into the top and bottom cleats, thus welding as it were the three into one solid piece. It is also well to nail small strips of wood to the stage at the foot of the frames both back and front in order to make sure of their not moving; this is especially needed opposite the doors. The side pieces (A and E) can be held in position in several ways according to circumstances, but chiefly by pieces of board lightly nailed to the top of the frames across the angles, and also by floor blocks.

Another very serviceable method of securing the flats may be given—the strut and stay—for use where the cross rope

cannot be stretched.

Suppose the flats to be placed at 2 feet from the end wall of the room in order to secure the usual passage behind them. Cut a piece of batten about 2 feet 2 inches long. Make fast a piece of stout string or rope from the flat to a nail, gas bracket, etc., in the wall, so that with the string tight the flat is nearly upright, leaning back towards the wall a trifle only. By jambing the piece of batten in between the wall and the frame, the flat will be strained both forward and backward, and held as in a vice. A fireplace is easily built of cardboard, blacked with Brunswick black, and a fire, if needed, can be arranged with a dark-room lamp surrounded at a safe distance with red paper, etc. The white china handles on the ordinary chest of drawers will be found to easily unscrew, and will serve well on our imitation doors. When the scenery is up in place, any trifling defects can be made good with spare paper and the paste brush, but the defects must be very glaring indeed if they are noticeable by night.

There are many other details which might be touched upon, but this article has already extended far enough. It must not be supposed from its length that the making of scenery is a serious undertaking. The writer is dealing with actual experiences, and can assure his readers that such a set of scenery can be constructed for considerably under £1 in two or three days; that it can be erected in some fifteen minutes singlehanded, and that, in appearance and use, it will satisfy the most critical of the audience and most exacting of the performers equally.

One last matter deserves a little consideration and that is the curtain. This sometimes offers a little difficulty to the amateur stage carpenter and so the writer suggests a plan which he has found effective and simple. It is the employment of

twisted wire rope

(about $\frac{1}{8}$ inch in diameter, such as is used for wire fencing) tightened by means of a "Spannish Windlass." At a suitable height from the stage make fast one end of the wire to a beam or pillar or something stout and strong on the left side of room, and then cut the wire a foot or two short of the other side of room, and form the end into a loop which will not draw under a heavy strain. Fasten a strong piece of rope to the loop and pass it round the beam or pillar, etc., on right side of room, and through the loop and round the beam again two or three times and make fast. Pass a strong stick or poker between the two parts of this rope bridle and twist it round once or twice; by doing so the rope is shortened and the wire drawn as tight as a bar of iron. The power gained by the twisting of the stick is very great, and all parts of the apparatus must be strong or something will be sure to break. Upon the wire thus stretched ordinary curtains can be hung by hooks (if by rings they must be threaded on the wire before it is put up), and it will be found to slide backwards and forwards with the utmost evenness and ease.

Architecture as a Subject for Lantern Slides.—No. VIII.

By T. PERKINS.

THE development of architectural exteriors does not call for any great amount of comment. All that need be said is that since our object is the production of a good slide we must take care that the negative while free from fog and possessing sufficient contrast to avoid flatness, must on no account be harsh with high lights in which all detail is blocked out, and shadows in which no details have been developed. The sparkling slide is in my opinion a type to be avoided; one often sees projected on the screen pictures which have little likeness to anything that one sees in nature, bearing a far closer resemblance to the lime-lit scenery of the stage than to a view lit by ordinary daylight. In order to secure a thoroughly satisfactory lantern slide, the negative should be full of detail, not over dense, with the deepest shadows, which of course will only occupy a very small area of the whole, clear glass, and the high lights, also very small in area, led up to from the shadows, and an abundance of half-tone. When developing a negative of an interior very great care is requisite. I generally prepare for the work in the following manner. I keep my developing solutions in two stock bottles; the pyrogallol I make up thus. I dissolve an ounce of metabisulphite of potash in nine ounces of rain water which has been allowed to boil fiercely for a quarter of an hour or so in order to expel the air, and when this has cooled down a bit, so that it may not crack the bottle, I pour it into an ounce bottle of pyrogallol which dissolves immediately, and then I re-cork it. This solution will keep

good for several months.

The other solution I make thus. I get two ounces of washing soda from the kitchen, and put it into a pint jug, pour boiling water over it, filling up the jug. When it has dissolved I decant it into a white glass spirit bottle. I also have a bottle containing an ounce of bromide of potassium dissolved in nine ounces of water.

For an ordinary exterior I pour out ten minims of the pyrogallol (1 grain that is of the solid), add half an ounce of the soda solution and make up the total bulk to one ounce with water. This I call my normal developer; for an interior I should add to this normal developer another ounce, or even two ounces of water, and watch the appearance of the image. If there are windows that I have reason to expect will develop up too dense, as soon as they make their appearance, back goes the developing solution into the measure and the plate is flooded with water. After this has been on a short time I pour it away and apply to the windows with a brush a diluted solution of bromide, made by mixing equal bulks of the stock solution and water; the developer is then poured on again, and the painting with bromide repeated as often as necessary. If I find the picture coming up rapidly, whether windows are included or not, I pour off the developer, flood the plate with water, rock the dish and go on developing with the water and the small amount of the developer that the water dissolves out of the film, or which remains in the dish after the bulk of it has been poured off. It is surprising to find how much detail is brought out by this exceedingly weak solution in the course of five or ten minutes. I leave this on giving the dish an occasional rock while I add another ten minims or even more of the pyro stock solution to the developer in the measure, and about five minims of the bromide stock solution. When all detail is fully out I pour off the water and pour the developer, strengthened as just described, once more over the plate. This will in all probability ensure a nice negative. If the negative has been evidently under-exposed, then I do not hesitate to add another half ounce or even more of the soda solution to the original developer; sometimes even I pour off the developer and soak the plate not this time in plain water, but in a mixture of equal parts of water and soda stock solution for perhaps five minutes; when this is poured off and the developer once again applied, unless the exposure has been far too little the picture will come up well, if it does not there is little chance of that negative being worth finishing. After having tried both ammonia and soda as alkalies I have abandoned the former; the latter keeps of a more uniform strength, and although there is a tendency to yellowness in the negative, yet this is, if not excessive,

an advantage

if the negative is not over dense, and can be easily removed if desired by immersing the negative, after it is fixed and swilled, for a few seconds in some of the clearing bath solution made for platinotype prints by mixing an ounce of hydrochloric acid with 80 ounces of water, and then washing well under a tap to get rid quickly of the acid, and then washing in water as usual. When the negative is fixed, washed and dried, a slide may be made from it, and if after modifying the process to suit the negative it is still found that there is difficulty in getting a good transparency, the negative may itself be modified by intensification or reduction. The method of intensification that I find answers as well as any other is this. I bleach with bichloride of mercury, well wash for a couple of hours in several changes of water, adding to one of these washing waters a little bromide stock solution to preserve clearness—doing all this in a dim light (the dark room by preference)—and then developing with some of my lantern slide hydrokinone developer diluted with an equal bulk of water. After the film is darkened through, a swill under the tap, a soak of a few minutes in the fixing bath, and a thorough washing will complete the process.

(*To be continued.*)

Contact Slides.

By G. R. BRYCE.

ALTHOUGH slide making seems to be considered a winter pastime, a large number of workers prefer to make their slides as they procure their negatives, so as to be ready to commence the lantern season in good time with their new views. More especially is this the case when the slides are so connected as to illustrate a lecture. Thus, a few remarks upon making slides by contact will not be out of place at this time of year.

Slide making by this process, as far as the mechanical part goes, is **one of the simplest** of photographic operations. It is the way most amateurs who combine the lantern with the camera make their slides, but it is only from negatives of small size that satisfactory results can be obtained.

Although much has been written concerning this method, it will not be out of place to describe shortly how to produce a lantern slide by contact. Suitable plates having been procured, the negative is placed in the printing frame, and the lantern plate over the portion intended for the slide, this being done in the dark room, of course. The back of the printing frame having been fixed, and the necessary exposure given by the illuminant most suitable for the plates, development and fixing are proceeded with, as if dealing with an ordinary, instead of a lantern plate, and when the slide is dry it is mounted and bound in the usual way. It is unnecessary for me to discuss the characteristics of a good slide, as these are already so well known.

Most, if not all, of the lantern plates in the market are suitable for contact printing. There are so many different kinds it is quite a difficult matter for the beginner to make up his mind as to the most suitable. Each variety of plate possesses good qualities of its own, and I think that given even a *fairly* good negative a passable slide may be produced on any of these plates. Before commencing, one must consider the resulting tone. The plates in the market give warm or cold tones according to exposure, development, etc., so that it is quite unnecessary to go to the trouble of preparing a toning bath, if the most suitable colour for the picture is considered beforehand. For cold tones the Ilford Special lantern plates will be found excellent. Warm tones, varying from red and brown to green may be produced on Ilford Alpha plates. Thomas's, Edwards', the Paget Co.'s and numerous other plates give beautiful cold and warm tones combined with great brilliancy. The Beernaert plate has the advantage of allowing the worker to use more light during all the operations. It is a decided advantage to be able to work by candle-light during development, etc., and it **reduces the difficulty** of judging the opacity to a minimum.

The Beernaert plates are sold at 11d. per dozen, and the packet contains, besides the plates, magnesium wire for the exposures, and masks and binders for the twelve slides. Although these masks are not elegant and these binders do not make very neat edges for the slides, still, the plates are capital, and have the advantage just named.

Although slides by contact are often made from quarter-plates, it is of benefit to have a negative of smaller size, so that the whole picture may be included; for this reason many hand cameras advertised should find a ready sale, as they take pictures the size of a quarter or half-plate. Those who intend making slides from their quarter-plate negatives should compose the picture on the ground glass with that object in view. Thus it is a good plan to cut a piece of stiff cardboard (a mount for instance) of a convenient size, with a 3-inch square opening; this may be moved up and down on the focusing screen, and will show, approximately, how much of the view will be included in the lantern plate.

Care should be taken when mounting the slides to see that the tops of church spires, etc., are not cut off by the mask. One sometimes sees a contact slide of a steeple or monument with the top of same hidden by, or appearing as if supporting, the mask. In the same manner, when making slides from quarter-plates sometimes the edge of the slide cuts rather a prominent object at an awkward place. For example, in a street scene perhaps a horse's mouth and nostrils appear just at the edge of the picture, and having been near the camera when photographing, they appear much larger on the screen than life size. Even if the other objects in the picture are larger than in reality this one will be represented extremely so, and the effect will be rather ludicrous. If on the negative a similar incongruity should occur, it should be left out of the lantern plate; on the other hand, if this cannot be done, as much as possible should be included, so that one may see accordingly, what the object really is.

The Lanternist's Practical Cyclopædia.—No. IX.*

By CHARLES E. RENDLE.

Dissolving Views.—These are obtained by the use of two lanterns one above the other, or side by side; in either case, the disc from both lanterns when thrown upon the screen must coincide. Whilst a picture is being shown in the first lantern the illuminant is turned down in the second, the next picture is placed in the second, then the light of the first is gradually lowered, whilst the light of the second is slowly turned up; the first picture dissolves away during the blending of the lights, and at the same time the second picture makes its appearance on the screen, taking the place of the first, and it is in this way that one view is dissolved into the next. A further dissolving effect may be described as follows:—In a pair of effect slides we get, Slide 1 "A mother kneeling beside the bed of her sick child." Slide 2 has an angel on it In the first lantern, slide 1 is thrown on the screen whilst slide 2 is ready in the second lantern, the light in the first lantern is partially turned down, and in the second slowly turned up for a few seconds and then down again, thus the angel appears and disappears over the sick child.

Double Motion Slide. — The difference between a motion slide and a slipping slide may be briefly put, that in the former the motion is constant—such as a pair of sailors dancing—and in the latter the movement or change is jerked, sometimes finishing in a stationary way, and sometimes a to and fro action is repeated a few times.

Double Rack Objectives. — There are also what is known as triple rack objectives; this means that instead of the ordinary draw tubes used for focusing, and drawn in and out by the hand, each portion is fitted with a rack and pinion, which enables the adjustment of focus to be made with greater accuracy.

Double and Triple Condensers.—*See* Condensers.

Drawtubes and Lengthening Tubes.—The drawtubes are the two tubes into which the lens mount is screwed, and belongs to the lantern stages proper, and when other pieces of tube are introduced between them, as is sometimes the case for long focus, the extra parts are termed lengthening tubes.

Duplex Regulator.—*See* Regulators.

Dynactinometer.—An instrument for testing the action of lenses, and the actinic force of the sun's rays.

Dynamo.—*See* Electric Lighting.

Educational Lantern.—The term until quite recently was associated with the science lantern, but it is no longer limited to any particular groove of construction. Any lantern may be used for educational purposes, providing there be no experiments to be shown.

Effect Slides.—A pair or set of slides to better demonstrate an artist's ideas, to make scenes and views more natural, etc. These can only be used in double and triple lanterns.—*See* Dissolving Views.

Elasticity.—An inherent property in various bodies, by means of which anything distorted, pressed, or extended, returns to its natural or former form.

Electric Lamps are for the most part of two kinds, the glow lamps, or lamps in parallel, and the arc lamps, or lamps in series. Although only an arc lamp would be employed in lantern work, a brief description of the glow lamp and its manufacture may also be useful. Attempts have been made to construct lamps in which the incandescent substance should be some high fusing metal, such as platinum or iridium, but without much success, in consequence of the heat generated by the electric current fusing the metals. Therefore, carbon in some form is universally adopted, and when this is enclosed in a vacuous glass chamber, no products of combustion are given off. By immersing a cotton thread in a saturated solution of sulphuric acid, and then drying in a charcoal chamber, it is converted into a thread of vegetable parchment, or carbon filament. This thread is then affixed to two fine platinum wires, which pass through the two lower walls of the glass globe which are attached to wires supplying the current; the air is then drawn from the globe to cause a vacuum, because the carbon burning in air would be fed by the oxygen of the air and rapidly consume. The globe is then filled with coal gas and sealed off. An electric current is passed through the thread; at once it takes a white heat which decomposes the coal gas, the filament gathering up the particles of carbon in its pores, and it is thus rendered incandescent. These glow lamps are chiefly used for lighting interiors, etc., their average life varying from two to four hundred hours, due to the various thicknesses of the filament, the smallest parts offering the greatest resistance. These lamps average 16 candle-power. It will be seen that a glow lamp is useless as a luminant for lantern work, whereas on the other hand the arc light is of the greatest intensity, and varies in power according to conditions, which are principally the construction of the lamp and the power of the current at command, and may range, say, from 500 to 100,000 candle-power. A short description of the principle of the arc light is as follows:—If two carbon points are brought into contact and the electric current allowed to pass through, nothing happens; but by taking them apart suddenly, an electric flash or spark is produced, and this experiment may be repeated again and again by bringing them back into contact and again taking them apart suddenly. But by their separation slowly so that only a small gap be allowed between them, the flash is no longer instantaneous, but a continuous arc of intensely heated, brilliant light. This is an arc light. Carbon has been chosen for these poles because it has been found upon experiment to give the brightest light. The carbon rods, or candles, as they are also called, are made from finely ground coke, lamp-black, syrup, sugar, with sometimes other ingredients mixed together, moulded in dies in the form of rods, a core running through the centre for the purpose of better centering the light, and baked. As these poles soon burn away, and the positive pole in about half the time of that of the negative, it is essential, in order to maintain the light, that the flow of current be kept up, and this can only be done by providing mechanical contrivances to bring the poles within distance, to enable the current to jump across. The automatic feeding of the carbons, and how it can be brought about by making the flow of current the main factor in accomplishing the desired end, has been the study of electricians and inventors for many years, and so successful have they been that perfection has been reached in most of them. The lamps principally used in lanterns are of the hand-feed type, and readers are recommended to make themselves acquainted with these, for within another decade there can be little doubt of their adoption wherever the current is available.

Electricity.—An inexplainable something, a subtle agent known as the electric fluid, that when excited by friction grows in power. The science of the laws of the phenomena of the electric current.

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Electrotype.—The art of making a facsimile of type, embossed metals, wood-cuts, etc., by the electric deposition of copper from solution, on a surface prepared (in facsimile) to receive it. An article of a non-conducting substance is covered with some conducting preparation, when if suspended in, say, a copper solution, and connected up with the pole negative of a battery, receives the copper deposit and reproduces every trace in its finest detail.

(*To be continued.*)

Jex Bardwell on Optical Lanterns.

ENGLAND has for many years held supremacy in all that regards the optical lantern and its appliances, and in some respects holds it yet, writes Mr. Jex Bardwell in *Wilson's Photo Magazine*. An English first-class triple lantern is a large, heavy, and a very costly affair. For instance, a Premier triple lantern costs £160; a Premier biunial lantern costs £105; a Perfect biunial lantern costs £73 10s.; the Docwra triple lantern, with jets and lenses, costs £213 12s.; and the Docwra biunial lantern costs £122. This is from $400 to $1,070, not counting duty.

It is also true that very cheap lanterns can be obtained; but in order to produce effects a "triple" is necessary, and as an English audience is very fond of admiring the instrument used, a good deal of ornamental work is placed upon it, sometimes regardless of cost, much of which is of no use as far as the result on the screen is concerned. They use effect slides and well regulated and selected dissolving views, not used here as a general thing, and in order to give these properly the lantern has to have perfect registration and suitable slide stages, with other appliances to produce certain mechanical effects, which many American lanterns are not provided with. The American lecturer generally contents himself with a set of slides on travels in foreign parts, sometimes including California and the Yellowstone Park. The framed slide is 4 by 7 inches and very thin; for this straight work there is no better lantern made than our biunial, known as a stereopticon. These are well and substantially made, no heavier than is necessary for stability, and are set up all ready to work in less than five minutes. My stereopticon or biunial weighs less than thirty pounds, and is as solid as a rock, has open slide stage top and bottom, with curtain slide, and will take a framed slide 7 by 5 and an inch thick, as may be necessary for some complicated mechanical effect slides. It was made in New York, and for satisfactory work I would not exchange it for the most costly lantern made. One American firm has adopted a plan for the quick removal of a cracked condenser, an accident which may happen to the most careful of operators. The removal is effected without displacing the jet or slide stage. Some such plan ought to be adopted in all lanterns. Another improvement desirable would be provision for the taking out of the back lens of the condenser (the one nearest the jet), and replacing it with a lens of longer focus to be used when working with a long focus objective. This gives better results and is less liable to crack. In place of the high pressure dissolver, I advocate the use of the automatic gas regulator. By using taps or valves on your jets you can better regulate the quality of light in each lantern, be it two or three, and obtain a uniform pressure of gas without trouble from the beginning to end.

Our English cousins have an improved system of working their objectives; there is affixed to the lantern a mount or jacket with rack and pinion. Into this jacket can be placed any objective from 4 to 14 inches focus, and the change may be made instantly, as the objectives of different focus are placed in tubes of one size, all fitting into the jacket. I understand that the celebrated opticians, Bausch & Lomb, of Rochester, will soon place on the market a set of lantern objectives fitted after this plan, made in the following sizes, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{4}{4}$, all of which fit an adjustable mount. The lenses are formulated to give extreme sharpness of definition and flatness of field over the full field of view. I shall have an opportunity to test their work soon; but that I think is needless, as this firm is known to turn out nothing but the best instruments.

The caps of most lenses are lined with black velvet, and it is sometimes desirable to cap an objective while the light is still turned on; by inserting a piece of white cardboard in front of the black velvet, the heat passing through the objective will have no effect on it. While quoting the prices of best English lanterns, it is only justice to say that a good plain English biunial lantern can be bought there for £20, equal $100. An American biunial that will do as good work as any made, with two pairs of objectives, dissolving key and jets, can be had for less than $175. I would like to say a few words about jets, regulators, and dissolving keys, but it would necessitate some drawings to make my remarks clear. This I may do at a future time.

The Invention and Development of the Optical Lantern.

By EDWARD DUNMORE.

CHAPTER XIV.

LANTERN slides have a character of their own, and are not adapted for any other purpose than exhibition in the optical lantern; on this account I will devote a short chapter to their development and preparation. The qualities of a good slide should be perfect transparency in the shadows, a fairly strong image, plenty of detail, fineness of texture, and good colour. Slides may be reduced from larger pictures in the camera, or printed of the same size by contact. There is no doubt that the special lantern plates now in the market are better than a plate not specially devised for the purpose; at the same time, exceedingly good results may be had with any clear working plate. In order to obtain the finest possible quality of image we must select plates in which the silver-bromide is in the finest state of division. The slower the plate as a rule the finer the image. Gelatino-chloride films are therefore generally chosen for lantern plates in preference to bromide for this reason, although plates made with the latter salt combined with a little iodide will, with suitable development, give excellent results, but the nearer the quality of image approaches a stain in appearance the better. A transparency may look very nice until magnified by the lantern lens, when it may be resolved into a

coarse-looking image.

It is an advantage to use a strong magnifier to examine the slide before deciding to adopt any particular make of plate. An instrument termed a lanternscope has been devised for this purpose, but if a trial plate can be shown in the lantern so much the better. As before alluded to, the light to be used for exhibiting them has to be considered, the more powerful the light the stronger the transparency must be, and *vice versâ*; in every other respect the same qualities are required for one light as another. In producing a clear image the mistake must be avoided of producing one devoid of detail in the shadows. A muddy looking slide, and one without any detail in the darker parts are about on a par for badness, although the bright under-exposed picture would be generally considered the best. Before exposing the plate, it is a good plan to stick a small patch of dark paper on one corner of the film side of the plate, this small patch should remain perfectly clear and unacted on throughout the development; to act as a guide to the exposure, the development continued until, with the exception of the very highest lights, there is a perceptible veil over the whole of the plate. The general appearance of the image on different kinds of plates varies considerably, but with all, this rule holds good—if the image appears quite buried in development it will not be suitable for a lantern slide, although it might be quite good for another purpose. As a rule, soda-pyro developer will, in any hands, give the best result. Pyro-ammonia or hydrokinone are preferred by some; ferrous-oxalate, I fancy, gives a much coarser image. The following developer is my favourite:—

A.

Pure Carbonate of Soda, 6 ounces.
Water, 80 ounces.

B.

Pyrogallic Acid, 1 ounce.
Fresh Sulphate of Soda, 6 ounces.
Strong Sulphuric Acid, 1 drachm.
Water, 80 ounces.

Use equal parts of A and B for a normal developer. If a little iron sulphate is added to the hyposulphite fixing bath the colour will be modified. A proper exposure will, without any further trouble, give a pleasant colour, long exposures and restrained development tend to warm colours, short exposure and strong developing to colder tints. If a slide is over-exposed reduction with perchloride of iron and refixing will clear it; intensification with mercuric perchloride followed by sulphate of soda solution, or weak ammonia, or cyanide of silver will procure the necessary density, each solution in its turn giving a different colour. Sulphite of soda gives the least additional density, and cyanide of silver the greatest. Most slides are improved by pouring over them, after fixing and washing, a little dilute hydrochloric acid, which will clear up the image nicely, If ferrous oxalate developer is used it should be followed by a bath of dilute sulphuric acid to dissolve off any oxalate of lime that may be formed with the water and cause a veil over the transparency, but a slide that develops up to the proper intensity at once is best. All slides should be well warmed in cold weather before placing them in the lantern. If this precaution be omitted a veil of condensed moisture will form on the slide and quite spoil the effect,, and be some considerable time before it quite dries off. If a number of slides have to be put through rapidly this condensation is particularly annoying, as it often happens the moisture has no time to thoroughly disappear before the next slide is put in, and it gives the effect of a fogged transparency.

(*To be continued.*)

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*Bromide Enlargements.**

By A. H. K.

FOR many years ferrous oxalate was considered the only developer for bromide paper, and although of late it has many rivals, notably amidol and metol, it still holds its own. Anyone who uses it must take as his watchword, "cleanliness." It does not agree with any of the other developers, and a little of one of them or a drop of hypo is quite enough to spoil a whole batch of prints. It also necessitates the use of an acid clearing bath. Hydrokinone has been tried and found wanting. It blocks the detail in the shadows, and sometimes gives an unpleasant tone to the prints. If the hydrates of soda or potash be used it has the tendency to impart a rusty appearance to the shadows. Eikonogen and rodinal may be used, but they possess no advantage over the others. Metol and amidol possess the advantages mentioned of being extremely simple to use; they do not stain and they produce agreeable tones. Metol gives colder tones than amidol. The secret of success with them depends on giving short exposures, and using strong developing solutions. Only about half the exposure is required compared with ferrous oxalate. A good formula for each is the following:

Amidol	4 grs.
Br. potash	1 gr.
Sulp. soda	48 grs.
Water	1 oz.

A.

Metol	48 grs.
Br. potash	12 grs.
Sulp. soda	480 grs.
Water	10 oz.

B.

Carb. potash	480 grs.
Water	10 oz.

For use, 3 parts A to 1 B.

The only practical drawback to amidol is that it readily oxidises, and does not, therefore, keep well in solution. Another advantage they possess is that when uranium toning is to be resorted to, there is no danger of the enlargement being ruined by traces of iron in the paper combining with the ferricyanide of potash and forming Prussian blue.

To secure good colour and successful results with ferrous oxalate, the solutions must be made up carefully and accurately. In general, the best results are obtained with the formulæ recommended by the makers of the paper used. Immediately after developing, and before fixing, the print must be flooded with a clearing solution of acetic acid 1 dram, water 32 ounces. The object of this bath is to prevent the precipitation of the iron in the fibres of the paper. Three changes of solution are necessary to effect this. After being well washed the print should be fixed in a bath of hypo 4 ounces, water 20 ounces. It is advisable to use two fixing baths to ensure thorough fixation. The washing after fixing should be thorough, but need not be unnecessarily long.

Toning.

The most satisfactory method of changing the colour of the print is by toning it by the uranium process. Formulæ:

Ferricyanide potassium	20 grs.
Acetic acid	½ oz.
Water	10 oz.
Nitrate uranium	20 grs.
Acetic acid	½ oz.
Water	10 oz.

Mix equal in proportions just before using. Success depends upon the following points: (1) As mentioned before, if ferrous oxalate has been employed for developing, every trace of it must be removed, or the ferricyanide will combine with the iron and form Prussian blue. (2) The print should not be strongly developed in the shadows. The process being one of intensification, the details in the shadows must be clear or they are liable to be overwhelmed. As the process adds more to the shadows than the high lights, it is decidedly useful for flat prints, as it improves their brilliancy. (3) The print must be thoroughly fixed and effectually washed. After toning, wash, till the high lights are clear. For black and blue tones use a bath composed of:

Sulphocyanide amm.	30 grs.
Gold	1 gr.
Water	4 oz.

The Eastman Co. recommends the following bath for producing sepia or brown tones: By following the above instructions, the finished prints will show delicate grey or rich black tones, which can, if desired, be readily changed into sepia, or rich brown tones of equal permanence, by making the prints somewhat darker, and then toning the finished and dried pictures in the following sepia toning bath:

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* Paper read at South Australian Society.

SEPIA TONING FORMULA.

Sodium hyposulphite	10 oz.
Alum	1 oz.
Boiling Water	70 oz.

Dissolve the hypo in the water first, then add the alum slowly. When all is dissolved the solution should be milk-white. This solution should not be filtered, and it works better as it becomes a little old; it may be strengthened from time to time with a little fresh solution. Never throw the bath away entirely, but replenish it in the manner stated. The best results are obtained by keeping the bath hot, or as warm as the emulsion will stand—say, 110 degrees to 120 degrees Fahr. In this bath, prints will tone in from 30 to 40 minutes.

Alum Bath.—When a toning bath is to be employed, the use of the alum bath after fixing is absolutely essential. Moreover, the prints should not, in this case, be subjected to a prolonged washing, but should only be slightly rinsed before being dried. A new bath tends to reduce the prints rather more than an old one. When toned, the prints may be placed in a tepid solution of:

Water	70 oz.
Alum	2 oz.

Then wash thoroughly.

Mounting.—The best mountant to use is starch paste. Prints should be mounted dry, and care taken not to allow any starch to get on the surface of the print, otherwise smeary marks are liable to show.

PATENT INTELLIGENCE.

The following List, relating to current Patent Applications, is compiled expressly for the "Optical Magic Lantern Journal" by W. P. Thompson & Co., Patent Agents, of 322, High Holborn, London, W.C., to whom all enquiries for further information should be addressed.

No. RECENT PATENT APPLICATIONS.

12156 of 17th May, 1897. R. J. W. Down. Improvements in and relating to magic lantern pictures.

12263 of 18th May, 1897. A. Preston. A new or improved apparatus for the manufacture of acetylene gas.

12341 of 19th May, 1897. L. A. Marion, H. Guibout, G. Bishop, F. Bishop, and J. P. Kirk (Messrs. Levy et ses Fils, France). Improvements in the mechanism and construction of apparatus for viewing or inspecting animated scenes without their being projected on a screen.

12468 of 20th May, 1897. J. H. Reeves. An improved method of taking, projecting, and viewing kinetoscopic and other photographic pictures.

12785 of 24th May, 1897. C. A. Day (W. Latham, United States). Improved apparatus for photographing objects in motion and for projecting the representations upon a screen or other surface.

13056 of 27th May, 1897. C. W. Baxter, C. Wray, and J. Oulton. Improvements in the method of arranging the pictures on animated photograph films, and in apparatus for operating such films.

13081 of 27th May, 1897. F. Dresser. Improvements in apparatus for generating acetylene gas.

13082 of 27th May, 1897. F. Dresser. Improvements in apparatus for generating acetylene gas.

13124 of 27th May, 1897. W. S. Simpson. Improvements in apparatus for producing or exposing photographic and like views (animated).

13163 of 27th May, 1897. W. S. Simpson. Improved means and appliances for absorbing or subduing noise in connection with apparatus used for displaying photographic and like views (animated).

13421 of 31st May, 1897. B. Acres. Improvements in apparatus for taking, viewing, or projecting photographs of moving objects.

13640 of 3rd June, 1897. J. E. Brindley, H. I. Gee, and J. H. Gee. An improved method of displaying kinetoscope or similar pictures on the screen.

13770 of 4th June, 1897. L. E. Hartley. Improvements in connection with cinematographs.

13826 of 5th June, 1897. J. H. Carthesey. Improvements in or connected with the means of obtaining optical effects such as called living pictures.

13866 of 5th June, 1897. J. F. Simpson. Improved means or method of producing, projecting, and exhibiting animated photographs and apparatus therefor.

SPECIFICATIONS PUBLISHED.

Copies of the following specifications may be obtained by remitting 1/- for each specification to W. P. Thompson & Co., Patent Agents, 322, High Holborn, London, W.C.

12128 of 1896. Reich. Apparatus for making or exhibiting zoetropic and similar pictures.

13147 of 1896. Atkinson and Labouchere. Automatic apparatus for the manufacture of acetylene gas.

15962 of 1896. Thorn & Hoddle. Apparatus for generating, storing, and cooling acetylene gas.

5236 of 1897. Bosque Y. Franco. Means for generating, holding and burning acetylene gas. Date applied for under International Convention, 27th July, 1896.

5913 of 1897. Alexandre. Apparatus for the manufacture of acetylene gas.

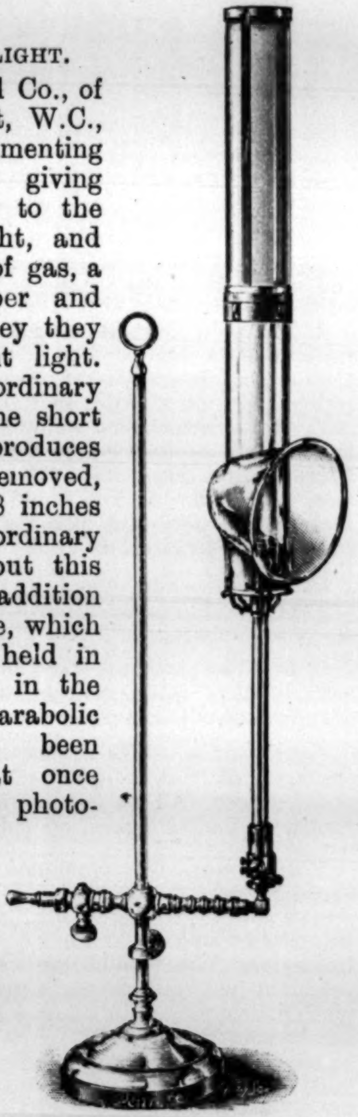
10186 of 1897. Morency. Apparatus for generating acetylene gas.

9719 of 1897. Lebeau. Acetylene gas burner.

NEW APPARATUS.

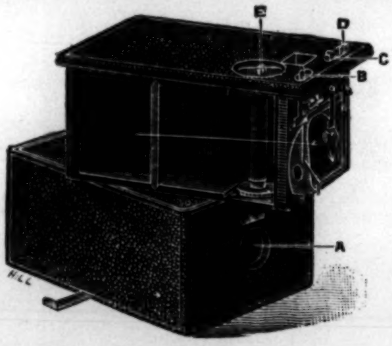
INCANDESCENT GASLIGHT.

Messrs. Penrose and Co., of Upper Baker Street, W.C., have been experimenting with the view of giving increased brilliancy to the incandescent gaslight, and with a good force of gas, a long mixing chamber and an auxiliary chimney they obtain an excellent light. When altering an ordinary Welsbach burner, the short mixing tube which produces the Bunsen effect is removed, and one of about 8 inches substituted. The ordinary chimney is used, but this is heightened by the addition of one with a flange, which enables it to be held in position as shown in the illustration. A parabolic reflector having been attached, it is at once ready for use for photographic copying and other uses, where a steady and constant light is required. This firm also supply a stand for holding the gas burner.



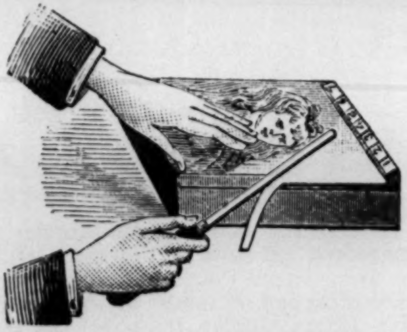
CYCLISTS' "HAWKMOTH" CAMERA.

This is the name of a small and convenient camera, specially devised for the use of cyclists by the European Blair Camera Co., Ltd. Its dimensions are $6\frac{1}{2}$ by $4\frac{1}{4}$ by $3\frac{1}{2}$ inches, and the weight when loaded for 12 exposures is only 18 ounces. The size of pictures taken with this instrument are $3\frac{1}{2}$ by $2\frac{3}{8}$ inches, and are on film, with which the camera can be charged in daylight. In order to open the camera, the clamping strip at bottom of camera is pulled out, when the camera proper may be lifted from its case, as shown in cut. A spool of film which consists of a strip of film and opaque paper wound together is inserted, and the end of the paper brought round the back part after which the works portion is inserted in its case. This having been done, the key (E) is turned several times so as to wind over the film a certain distance, this being determined by the figure (1) appearing at a small ruby covered hole at the end of the camera, which denotes that exposure (1) is in position, and so on until the twelve have been exposed. The exposure is made by pressing the lever B; this gives instantaneous exposures, whereas if the knob C be first pulled up, time exposures are given by the same means. The camera has a good lens, which is fitted with three stops, either of which can be brought into position by a movement of the lever D. The shutter is of the "ever set" style, which necessitates the trigger B being pushed in alternate directions, the direction being ascertained by an arrow which is seen at the lens aperture A. The camera is well and strongly made, and is covered with morocco leather.



PRIMUS LIGHTNING PRINT TRIMMER.

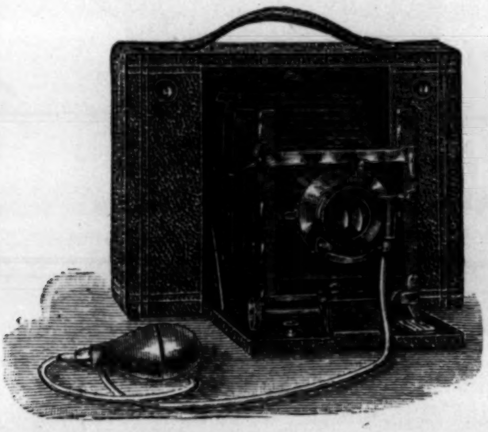
Messrs. Butcher & Son have recently introduced a simplified trimmer for prints, the action of which is on the scissors principle. It consists of a board, at one edge of which is let in a steel



strip; at right angles to this, and raised up a little so as to form a guide, is a boxwood rule. The prints are held against this guide at the desired number of inches, when that part of the paper lying over the steel strip can be quickly cut off by running the steel cutter, which is mounted in a handle, along its edge after the style shown in the illustration. In this manner prints can be expeditiously trimmed, and placed as finished into the box under the trimming board.

NO. 4 CARTRIDGE KODAK.

The film cartridge system has now been applied by the Eastman Company to the folding kodak, as shown in the illustration. This camera takes pictures 4 by 5 inches, and the film capacity is twelve exposures without reloading. The same camera can be used with plates if necessary. The camera, which when closed measures 3⅛ by 6¾ by 6⅛ inches, is very complete, being fitted with rising, sliding, and falling front, two view finders, focusing index, rapid R.R. lens, Iris diaphragm, pneumatic shutter, and all requisites that go to make a high-class and complete instrument, which can be reloaded in daylight.



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Notes and Queries.

Fred.—Your form of saturator would answer admirably, but the spreading out idea of the tube containing the small holes forms one of the claims of the patentee of the gridiron saturator, and we would advise you to read this specification before putting them on the market. If, however, it is only your intention to make one, why not write and explain matters to the patentee and ask permission.

W. S.—Nelson & Co., gelatine manufacturers, London.

H. C. M.—We wrote you privately.

W. H. Mathieson (*New Zealand*).—The firm to which you allude have gone and left no address. At the time at which you speak of, calcium carbide wa sparticularly scarce, and prices went up suddenly in consequence. It is true they had advertised the price you quote, but then a long time had to elapse between this quotation and your order being received, as the journal had to reach New Zealand and your letter had to come to England in reply. No good would be done by publishing the letter in question seeing that the firm is out of existence now.

T. R. D.—Keep all oil or grease away or the result may be disastrous.

Subscriber writes: "What is the new Molteni lamp which has been spoken of lately?" *Ans.*—It is the gridiron saturator which has been described in our columns.

Patenting.—If you write or apply to Messrs. W. P. Thompson & Co., 322, High Holborn, they will supply you with a list of the charges *re* taking out patents.

A. B. C.—1. Give it a coat of good whitewash, to which a little blue has been added. 2. The longest tube should be 3⅞ diameter. If you order three nested with a rather tight fit, a dealer in tubing will understand. 3. About three inches long will answer. 4. The number of the patent application of the Aerial Graphoscope is 14443, of June 30th, 1896. The specification has not yet been published. 5. You would find the one you suggest just as effective, and perhaps easier to work. You omitted to sign your letter.

W. Herkins.—You should use the bromide for the over-exposed, not the under-exposed, as per your letter. Try again and report.

E. D.—The particulars and drawings of a lantern as used in 1737 will appear in our next, it having been crowded out of this number.

Acetylene User.—We do not know the whereabouts of the Acetylene Gas Company who had premises at Ashford and Putney. All we can say is, that letters have been returned, marked "gone, no address."

T. R. Brooks.—The combined toning and fixing bath can be made as follows:—Hypo, 8 ounces; alum, 6 ounces; water, 80 ounces. When this is dissolved, add 2 ounces of borax, which must previously be dissolved in hot water. This should stand for several hours, when a sediment will fall to the bottom. Decant the clear portion, which put in a bottle labelled A. The residue can be poured away. Into another bottle which should be labelled B, put chloride of gold, 15 grains; sugar of lead, 64 grains; and water, 8 ounces. For use take in the following proportion: A, 8 parts; B, 1 part.

X. Z.—The double saturator of which you speak was made by Cutts, Sutton & Co., of Sheffield. We think they discontinued its manufacture several years ago. We have often seen them in dealer's shops, and think you will have no difficulty in obtaining one.

Judge.—We should say that A knew little of the subject, and that B's advice was well worth taking.

Binders.—Mr. W. C. Hughes, of Kingsland, can supply metal binders for slides.

No Name.—Consult the indices which are issued with each number of this journal for January, and you will find a vast deal of information on the subject.